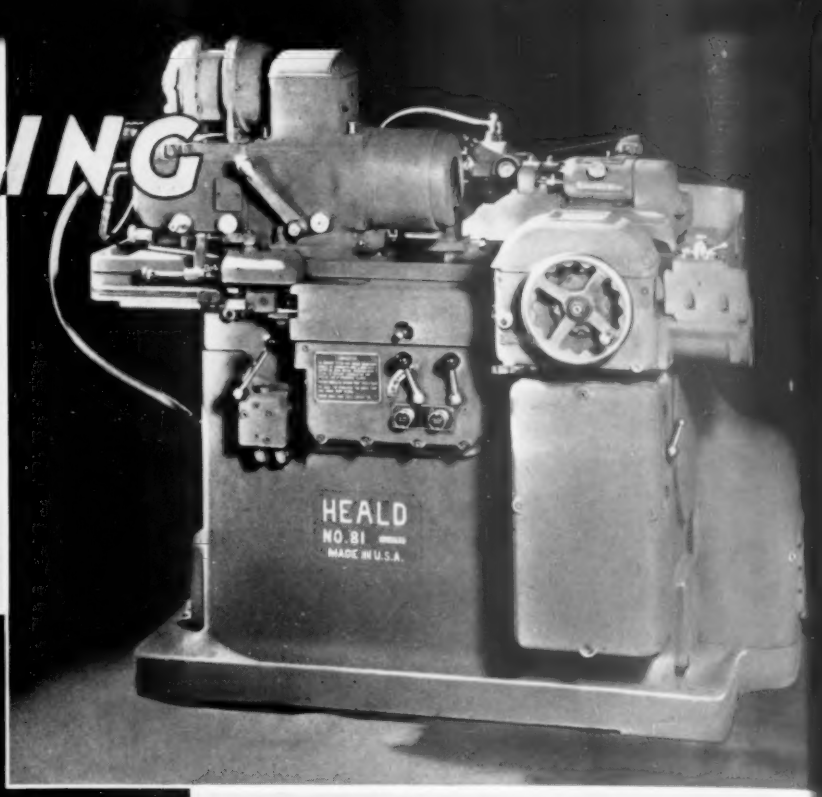
OCTOBER 1934 ● VOL. III. No. 6

© 1934 A.S.T.E. Journal Publishers

The A.S.T.E. Journal

Official Publication of the AMERICAN SOCIETY OF TECHNICAL ENGINEERS

GRINDING



The Heald Style No. 81 Internal Grinding Machine. An automatic especially designed for handling work with small holes.

PRECISION BORING

The Heald Style No. 46A Bore-Matic. A double end Precision Boring Machine for multiple parts and mass production.

TODAY, manufacturing requirements on units with moving parts call for the greatest of accuracy in order to obtain longer life, quietness and the most efficient operation. The securing of these results depends largely on the hole finishing and facing operations of the various parts. Only the greatest of care in the selection of the equipment for doing this machining will give desired performance.

Our complete line of grinding machines, plain or automatic, handling from the smallest to the largest hole gives our engineers a chance to offer just the machine for the job.

In addition to grinding, we can offer various styles and types of Precision Boring Machines, thus, without being influenced with the desire to sell any one particular type of machine tool, we are able to recommend either grinding or boring depending on which will give the best results.

Nor do the Heald possibilities end with just standard equipment as we design and build special arrangements, fixtures, or even complete machines tailor made for the job, thus giving special requirements on a production basis.

The Heald Machine Company, Worcester, Massachusetts, U. S. A.

The A.S.T.E. Journal

Published Monthly by The A.S.T.E. Journal Publishers for members of the

AMERICAN SOCIETY OF TOOL ENGINEERS

T. B. Carpenter, President
R. M. Lippard, First Vice-President
Ford R. Lamb, Second Vice-President
A. M. Sargent, Secretary
Joseph F. Slavik, Treasurer

Vol. III October, 1934 No. 6

O. B. Jones, Editor
8203 Woodward Avenue
Detroit, Michigan
Madison 8422

Roy T. Bramson, Bus. Mgr.
6432 Cass Avenue
Detroit, Michigan
Trinity 2-8510

Address all correspondence pertaining to editorial matter in *The A.S.T.E. Journal* to Editor's office. Refer all other matters and advertising in *The A.S.T.E. Journal* to the Business Manager.

INFORMATION PERTAINING TO MEMBERSHIP IN THE AMERICAN SOCIETY OF TOOL ENGINEERS may be had by addressing the Secretary's office. All matters relative to the Society should also be addressed to the Secretary's office—8316 Woodward Avenue, Detroit, Michigan. Telephone Madison 2057.

BE SURE TO READ IN THIS ISSUE

Page

Engineering Design Simply Applied—
O. B. Jones 6

Do You Know Your Organization?
John Younger 7

Recent Patent Grants 8

Diversified Uses of "Metal Spray"—
C. E. Phillips 12

Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers, be responsible for statements appearing in the Journal either as advertisements or papers presented at its meetings or the discussions of such papers printed herein.

Copyrighted by A.S.T.E. Journal Publishers

An Announcement

●

CERTAIN of our friends and customers have formed the idea that we specialize in the manufacture of multiple drilling and tapping heads, index tables and holding fixtures so we take this opportunity of informing our friends that we maintain a very complete die shop.

Our equipment is very large and complete and consists of three Keller Automatic Die Cutting Machines, the largest one of which is Type BG-2-1085, which is the largest machine made by the Keller Company.

Then we have four Lucas Boring Mills, two Pratt & Whitney Jig Borers, 18 grinders, 12 tool room lathes, 6 radial drills, 9 milling machines, 2 planers, 16 crank shapers, 2 slotters, 2 large Toledo try-out presses and the most complete and varied assortment of small equipment that money will buy.

Our machines are of such manufacture as Lucas, Pratt & Whitney, Heald, Cincinnati, Brown & Sharpe, Hendey, Carlton, Etc.

Please call on us and look this equipment over. You will be cordially received and you will be astounded at the size of our plant.

We hope you will keep us in mind on your next large program.

●

F. JOS. LAMB CO.

DETROIT, MICHIGAN

6343 Wight Street **Fitzroy 5382 5383 5384**

Manufacturers of Crank, Cam, Piston, Valve Face, Side Gear, Internal, Ball Race, Plain and Universal Grinders for the automotive industry.

LANDIS TOOL CO. WAYNESBORO PA
DETROIT•CHICAGO•NEWARK•PHILADELPHIA

Pioneers in the development of hydraulic grinding machines and in the application of the large diameter grinding wheel.

MECHANICAL PERFECTION . . . . .

Style 4

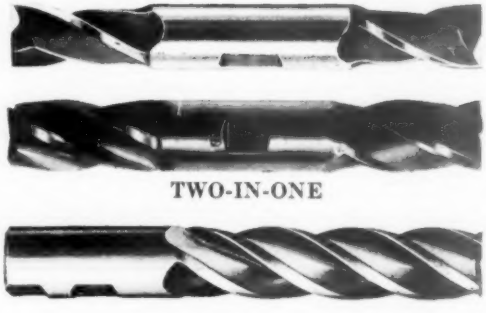
in your tools and fixtures, means that they are equipped with Non-Rotating Cylinders with features which assure excellent performance—features which are found only in

"HOPKINS"
NON-ROTATING CYLINDERS.

Send for catalog

THE TOMKINS-JOHNSON CO.
624 N. MECHANIC STREET Jackson, Michigan
Detroit Representative - HABERKORN & WOOD

Two-In-One for the Price of One



TWO-IN-ONE

SINGLE ENDS, ALSO

SHEAR CUT END MILLS AND HOLDERS

Send for latest catalog

Progressive Tool & Cutter Company
2346 WOLCOTT STREET
Ferndale, - - - - Michigan

MEETINGS

OCTOBER

(DETROIT)

HOTEL FORT SHELBY BALLROOM

OCTOBER 11th, (THURSDAY)

*Dinner	6:30 p. m.
Meeting	8:00 p. m.

Speakers		Subjects
Wm. A. Smila	A. S. T. E. Member	
R. M. Lippard	A. S. T. E. Member	"Fabrication of Connecting Rods"
V. M. Darsey	Parker Rust Proof Company	"Phosphate Coatings and Metal Finishing"

SPECIAL ENTERTAINMENT — GET FULL DETAILS OF CINCINNATI TRIP — OCT. 19, 1934.

*Tickets for dinner may be had at Secretary's Office or at the door.

SEPTEMBER MEETING

The September Meeting of The Society was very well attended — several hundred members and friends, being present to participate in the "Give and Take" Conference meeting. Six members were scheduled to give talks of from fifteen to twenty minutes each, but only three finished because of the interesting discussions which followed each talk. These will be continued and talks will be reprinted in the *Journal*. The first of these appears this month on page 6 of this issue.

NOVEMBER MEETING

Ralph E. Flanders, well known to manufacturers, President of Jones and Lamson Machine Company, Springfield, Vermont, will address the American Society of Tool Engineers at the Detroit meeting to be held November 9th at the Fort Shelby Hotel. His subject will be "The Machine Tool Industry and Its Relation to the Automotive Industry." All members are urged to be present for this important meeting.

ENGINEERING DESIGN PRINCIPLES SIMPLY APPLIED TO TOOL ENGINEERING

★ by O. B. JONES, A.S.T.E. Member

THE purpose of what follows is to show by examples and well established formulas how simple the processes are of determining the magnitude of the stresses to which various parts of tool design devices are subjected.

Perhaps there are tool designers here who have wondered, for instance, how to determine the pressure upon the tool bit by the piece being turned in a lathe. In many cases it is not necessary to determine this load. There are cases, however, where a design of higher quality is obtained by a knowledge of such things.

If you know the pressure on the tip of the tool you can determine the deflection of the bit under load and can guard against excessive vibration so disastrous to tungsten-carbide tips: You can determine the sag of a boring bar and prevent its occurrence by calculating what its diameter should be to withstand this pressure and the imposed torque load: you can determine the radial and thrust loads on the headstock spindle and the radial and thrust loads on ball-bearing equipped tailstock center and make specifications accordingly—and, beginning at the tip of the tool, determine the load on every detail of the lathe (or any other machine employing a single pointed tool bit) and design a machine of proper proportions.

Turning Loads

If you will look at Fig. 1 for a moment you can readily establish the following relationship: F times D equals the area of the chip cross-section. This area will be referred to later on as A.

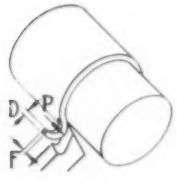


Fig. 1.

C=340,000 pounds per square inch for high grade steel.
C=260,000 pounds per square inch for mild steel.
C=185,000 pounds per square inch for cast steel.
C=130,000 pounds per square inch for cast iron.
C=115,000 pounds per square inch for bronze.

A simple formula for determining the chip pressure on the tool bit is Pressure equals the cross-sectional area of the chip times the constant C, or P=AC. The values for the constant C have been determined by experiment for various metals and are indicated in Fig. 1. The number opposite the kind of material indicates the pressure required to turn up a chip having a cross-sectional area of one square inch.

Let us determine the chip pressure on the tool bit in Fig. 1 if the material is cold rolled steel. Assume the feed to be 1/32 inch and the depth of cut as 1/16 inch. The cross-sectional area of the chip is 1/32 times 1/16 or 1/512 of a square inch. The pressure required to turn up a chip of cold rolled steel having a cross-sectional area of one square inch is given in the table as 260,000 pounds. Since our chip has only 1/512 as much area the pressure will be only 1/512 as much or approximately 500 pounds.

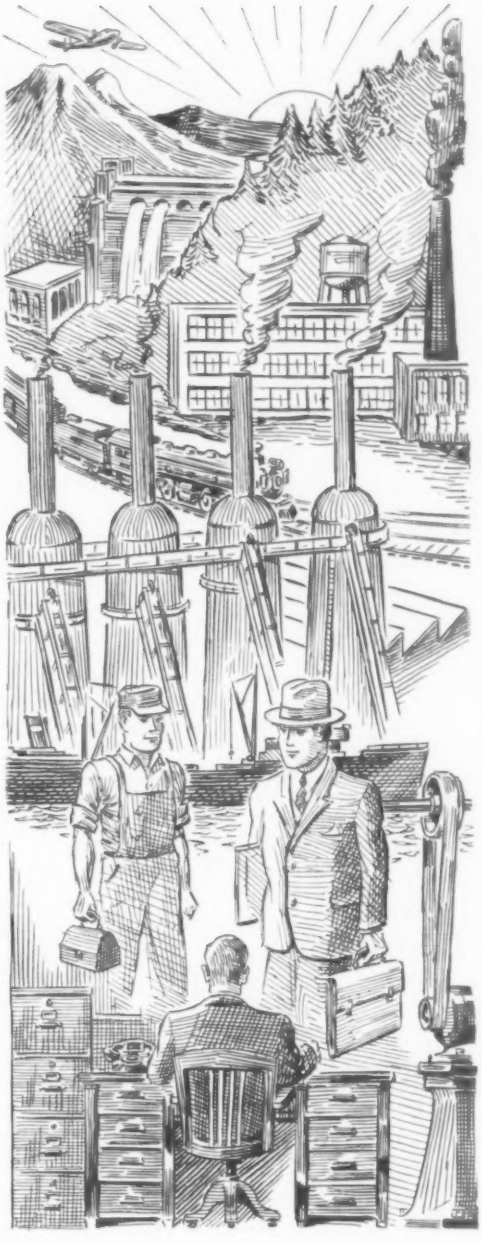
Now let's determine the horsepower required to drive the lathe under these conditions. As you all know, horsepower is the quotient obtained by dividing the number of foot-pounds of work performed in a minute by the constant 33,000. The number of foot-pounds of work performed in a lathe in a minute is the length in feet of the chip produced in a minute (or the cutting speed in feet per minute) multiplied by the chip pressure P, or S times P, if we call the speed of the lathe S. The horsepower required for a 100 per cent efficient lathe would be S times P divided by 33,000. Assuming the average lathe to have an efficiency of 75%, 4/3 more than the horsepower indicated would be required, so we would multiply S times P divided by 33,000 by 4/3. (H.P.=4SP/3x33,000) Now, since P=AC we substitute AC in the formula in the place of P and get H.P=4S AC/3x33,000. For C.R.S. C equals 260,000 pounds. If this is put in the formula in place of C, H.P.=10 SA. (For cast iron C=120,000 pounds and the formula is H.P.=5SA.)

Now that we have developed a simple formula we can easily determine the horsepower required for the job in Fig. 1. The horsepower required is ten times the cutting speed multiplied by the area of the chip. If we assume a cutting speed of 96 feet per minute, then the H.P. read is ten times 96 times 1/512. (1/512 being the cross-sectional area of the chip.) This gives us a product of 1⅞, which is the horsepower required for the cut. If the cutting speed had been one half as great, that is, 48 feet per minute, then only one half as much metal would be removed in a minute and the horsepower would have been one half as great or only 15/16.

It should be noted, in order that the substance of this formula be easily carried in mind, that since S is the length of the chip turned in a minute and A is its cross-sectional area that the product S times A is the volume of metal removed in a minute and that the horsepower is directly proportional to the volume of metal removed. In the formula, HP=10SA, S is the cutting speed in feet. If the cutting speed is changed to inches, the number of cubic inches of metal removed in a minute is 12SA. The ratio of the horsepower required to the number of cubic inches of cold rolled steel removed in a minute is 10 to 12, and the horsepower required to remove a cubic inch of mild steel in a minute is 10/12. By the same reasoning, 5/12 of a horsepower is required to remove a cubic inch of cast iron in a minute with a single pointed tool on a lathe. In the example we have just worked out 2¼ cubic inches of metal were removed in a minute. Ten-twelfths of this number of cubic inches represents horsepower, or 2¼ times 10/12=1⅞ horsepower.

DO YOU KNOW *YOUR* ORGANIZATION?

A good manager *knows* his organization. In this feature John Younger gives you fundamentals, well worth your knowing, —both as to what constitutes organization as well as what makes good management. Read this, now, and keep for future reference.



Be it "vertical" or "horizontal," in type, successful organization cannot escape managerial efficiency.

SOME companies are so organized that they have only two functions—purchasing and selling. The other extreme is the company which makes everything and exercises all manufacturing functions. The former is called a horizontal organization; the latter is a vertical. A discussion of the characteristics of each type is given here to complete the ideas on organization begun in the September *A.S.T.E. Journal*. It also shows the nature of the work that men do when they are banded together for a common enterprise.

Our big chain stores, drug and grocery, are examples of the horizontal type. Goods are purchased, placed in the salesroom or store shelve, nothing is done to them and they are eventually sold. There is practically no creative joy in such an enterprise. The spirit of joy comes in the accomplishment of making money. Yet of course such companies perform a vital function in distribution. They serve as a storehouse to gather commodities of one kind so their customers can buy them in the most accessible manner.

There are some manufacturing establishments which have very similar functions. The Eastman Kodak Company, for example, gathers together all the goods that are necessary for the practice of the art of photography. Some of the goods they purchase and sell to the public through their dealer organizations without charge, but many of the products are manufactured by themselves. We see here a mixture of the horizontal and vertical types so we call this a diagonal organization.

Parke and Davis, the big medical drug manufacturers, are probably diagonal in their character as for some of their products there is little done except collection and packaging.

One can rarely say that such and such a firm is purely vertical, another horizontal and a third diagonal, as the character of firms vary step by step from the extremes.

General Motors Corporation is in a sense diagonal, yet it bends strongly towards the vertical type as it does so much manufacturing.

The Ford Motor Company is, however, our best example of the vertical. The company owns and operates its own iron ore mines, its own lumber forests. It owned and operated its own transportation facilities carrying these materials to its main plant at River Rouge. The ore passes through the blast furnace, the open hearth, and the forge shop to become forgings ready for machining, or takes the path through the cupola to become castings. Machining and assembling are done on a large scale and virtually only one finished product, the Ford car, is evolved. The vertical character runs further with the Ford Company as the outlets of distribution are largely controlled so that it can be said the organization functions from raw material straight through to the ultimate sale of the product.

The Ford Motor Company is, of course, a huge company but size is not necessarily an integral part of the vertical type. An example on a smaller scale is the Timken Roller Bearing Company of Canton, Ohio. This company gathers together its raw materials and converts them into steel ingots in its own steel mills. It rolls and finishes these ingots into steel shapes from which it makes its bearings, finally selling them to the ultimate consumer.

Even the little foundry making its own patterns, melting the pig and machining and assembling the finished product shows a distinct tendency towards the vertical type.

In the vertical type the joy of manufacturing is the spirit of creation.

(Continued on page 10.)

★ by JOHN YOUNGER

RECENT PATENT GRANTS OF INTEREST TO THE TOOL ENGINEER

By WILLIAM J. BOYD

Washington Correspondent, The A.S.T.E. Journal

More than five thousand patents were granted by the United States Patent Office during the past month, and to make a conscientious study of these articles and contrivances affords a comprehensive education that cannot be attained by years of study in the most renowned university of our age and time.

To peruse this practically inexhaustible supply of the product of the workings of the brains of the world is similar to reading the pages of an enlarged encyclopedia, printed in a language one has never seen, but a more conscientious and systematic study of the numerous articles for which patents were allowed by the United States Government during the month, which includes not only a new sweat band four your next winter's hat, a new implement to dig the garden with, and a new tie for railroad trains to travel on, several inventions were found that should be of inestimable value to the engineer interested in mechanical and electrical tools.

Some of the outstanding patents granted during the month include:

Injector Valve

A patent has been granted by the Patent Office to John Leonard Taylor, of Kenosha, Wisconsin, the invention relating to improvements in changing injector valves, as same concerns all engines of the Diessel type, or similar variety, wherein crude or fuel oil or other fluid is combined with compressed air to form the explosion medium.

The object of this invention is to greatly improve the construction and operation of this type of valve, while a further object is to provide such a device which will be substantially self-cleaning, and which will tend to remain permanently tight.

Another object of this invention is to provide a device casting and valve element, which is provided with means for rotating at all times when it is unseated.

Editor's Note: Each of these patent grants has been issued during the past thirty days. Interested readers, desiring further information reltaive to any of these grants may call upon The A.S.T.E Journal, which will be glad to supply names and addresses of patentees and any information as can be obtained by its Washington correspondent—free of charge. Enclose with your inquiry self addressed and stamped envelope.

Compressor Unit

A patent has been granted to Joseph W. Cuthbert, of Campbell, California, for the incention of a compressor unit, which has special reference to a compressor of the eccentric displacement type.

The main object of this invention is to provide a compressor unit of high efficiency which will compress gases to high pressure in a single stage, and which will by its method of operation reverse the heat of compression for the gases during the compression stage.

Another object of this invention is to provide a compressor unit which is self-cooling, self-sealing and self-lubricating, and which is automatically controlled by the operation thereof.

Quick Action Valve

A patent has been obtained by Joseph C. McCune, of Edgewood, Pa., for an invention which relates to fluid pressure brakes, and more particularly for means for affording quick action through the brake pipe of an automobile fluid pressure brake system.

It has been found that the quick action means at present employed does not act with the desired rapidity on long trains, so that in effecting an emergency application of the brakes, the brakes are both to be applied on cars at the head end of the train sufficiently in advance of the application of the brakes on the cars at the rear end of the train so that dangerous slacks are produced by the consequent running in of the slack. The principal object of the new invention is to provide improved quick action means by which the time of quick action transmission is reduced to a minimum.

Wheel Aligner

A patent has been granted to Charles O. Hink, of Grinnell, Iowa, which relates to an invention for new and useful improvements for determining misalignment of vehicular wheels.

The principal object of this invention is to provide an instrument or tool, which, in operation, will be partially automatic, and which in construction is simple, permitting manufacture at a low cost.

News Notes of Interest to the Tool Engineer

O. J. (Jack) Huntley, Excello Aircraft and Tool Company, is now transferred to the sales staff of the company and will be located in the Dayton territory. He will handle Excello cutting tools, bushings, spindles, multiple equipment and precision boring equipment.

Carboloy Company announces removal of their general offices and plant to 2985 E. Jefferson Avenue corner of McDougall, Detroit.

H. C. Satterthwaithe, manufacturers agent, well known to A.S.T.E. members of the Detroit area, announces a "Hole Engineering Service" "Engineered to Product and Plant." Mr. Satterthwaite an expert on this phase of production engineering will provide a complete engineering service pertaining to boring bars, reamers, drills, "Bearingizing" taps, hones, broaches, gages, etc.

Go to Cincinnati Oct. 19th. Society Sponsors Trip

Tool Engineers of the Detroit area will leave for Cincinnati October 19 at 11 p.m. returning Saturday Evening, October 20 at midnight. The trip costing but $5.50 is sponsored by The Society. All other expense is borne by the hosts—The Cincinnati Milling Machine Company. Get full details, tickets etc. from Secretary's office—Madison 2057.

HERE IT IS!

the 6" AUTOMATIC STUB LATHE

Again Sundstrand announces a new machine-tool development of major importance to all executives concerned with metal turning. It is the Sundstrand 6" Automatic Stub Lathe, shown above. Design is based on our extensive and extremely practical experience in production turning gained from a large number of successful installations of 8", 12" and 15" Stub Lathes. Capacity is 19" between spindle-nose and tail center, 13" diameter swing over bed ways, 7½" to 8" diameter over tool slides. Machine is available in 3 models:—Model A has gear drive to spindle, speed range 62 to 654 r.p.m. Model B has vee belt drive to spindle, speed range 328 to 1791 r.p.m. Model C has flat belt drive to spindle, speed range 1000 to 3500 r.p.m. Each model may have any one of the following operating cycles:—

HAND OPERATED—Rapid approach and return of tools is by manual operation of a large hand-wheel. Feed and spindle are started and stopped automatically by dogs on carriage.

SEMI-AUTOMATIC—Manual operation of a hand lever starts the operating cycle which then completes itself and stops automatically.

FULL AUTOMATIC—Pressing a button starts the machine which then runs continuously. The complete operating cycle is re-established by movement of an automatic work loading slide. Extremely accurate, powerful, and durable; the Sundstrand 6" Automatic Stub Lathe presents many possibilities for cutting costs and improving production on a wide variety to turning operations. Investigate! Let us give you a copy of the circular describing this new machine in detail.

SUNDSTRAND MACHINE TOOL CO. · ROCKFORD, ILLINOIS, U.S.A. ·

LATHES
MILLING MACHINES
CENTERING MACHINES
BALANCING TOOLS

STERLING-FRENCH MACHINERY CO.

NEW CENTER BUILDING - DETROIT, MICHIGAN - Phone Madison 3660

Exclusive Sales Representatives for Sundstrand Products in the Detroit Territory.

Centralized and Decentralized Organizations

(Continued from page 7.)

The question of centralization is an important problem and a human engineering problem in industrial enterprises. How much responsibility should be given and taken by the individual or how much should he be governed.

We have seen this problem answered to some extent in the functional organization of today where each functional executive has practically entire responsibility for the department under his charge. This answer shows an obedience to the law formulated by L. P. Alford.*

The manager whose duties become so pressing or numerous delegates some of them to an assistant who assumes the responsibility. Adequate authority should be delegated at the same time, responsibility is shifted, so that control may be had of all the necessary means of doing the work.

It was in the writer's experience to work in companies where the working out of this law could be seen very effectually. A large company in Pittsburgh was of the centralized type. It had many branch factories scattered throughout the country and the manager had responsibility but no authority. All authority was centralized in "the master mind," the president of the company. When anything had to be done, even quite minor affairs, he was always consulted. Decisions were always given by him and very often due to the location of the plant he was not available. Telephone service was, of course, tremendous, but such service lacks the individual personality touch that only a personal conference can give. Many serious delays took place, business became disorganized and the company passed out of business.

Another company was the Standard Parts Company of Cleveland where centralization was carried out to an enormous extent. This company had many plants in various locations and manufactured a diversity of products, chiefly for the automotive industry. There was a director of sales supervising sales of all concerns. There was a director of personnel supervising all hiring and firing no matter what plant. The central chief purchasing agent supervised the purchase of all materials no matter how small for all plants. The managers of the individual plants were managers in title only, much of their proper authority was taken from them with a corresponding slackening of their interest in the plant.

There was even a chief plant engineer for all plants whose duty was to supervise the maintenance and power requirements no matter where the plant was.

The theory, of course, was logical. It was felt that the best man could be procured for the job and efficiency would result with corresponding decrease of overhead charges. Actually the opposite took place and a reorganization was deemed advisable. It was too late, however, particularly as the change took place on the eve of the 1921 depression, and the company went under with great loss.

Both of these companies were flying in defiance of this law of responsibility and authority and both suffered the consequences.

Let us consider a more pleasing and happier case. Perhaps the best example of decentralization is carried out in the organization of the General Motors Corporation. Here we have many plants, ranging from spark plug through iceless refrigerators, glass and radio sets to the automobile. Each plant is distinct in itself with its own president or general manager; each plant has complete responsibility and authority. If the Buick Motor Car Company wants to bring out a model of peculiar body design, it may do so and occasionally it does so. No other plant of the organization need copy them. If Lovejoy brings out a new shock absorber it must satisfy the chief engineers of the various plants that the new device is better before they are compelled to adopt it. Each plant has complete autonomy, and yet there is a powerful tie up in the financial limitations that are placed. Each plant must operate within a budget set up by the headquarters staff and each must rigidly adhere to that budget. They may engage on new design or new models, but must keep within their money restrictions. A homely example of this might be given wherein one father will say to his son, "Son! Here is ten dollars. I expect you to spend one dollar on amusements, six dollars on food and three on clothing—no more, no less." The son placed under such restrictions has no independence of action of his own, he is governed by his centralized father.

But another father might say, "Here is ten dollars. That's all you can get. It's up to you to spend it wisely." This second son is placed on his own responsibility as to the spending and appreciates the fact and develops an independence of action that is distinctly good for him.

So we find today a distinct tendency towards decentralization, a tendency that is altogether good for the man who has the burden of responsibility. A tendency which develops the best powers latent in the executive, and makes for progress. Responsibility must be accompanied by authority.

What is a Good Manager

We have seen how the general manager is the leader of the industrial orchestra, but although he may not be able to play as well as some of his artists, yet he must have a knowledge of music to guide them. In industry he may not be as gifted in the special lines as his assistant executives yet nevertheless he must know something about the business if he is to control his plant properly.

Many chief executives graduate into their positions from some specialized field. An exceptionally good sales manager is often held to be the proper timber for general managership. Sometimes an outstanding engineer may be promoted and so it goes on. Yet each and all on attaining this post must amplify their previous specialized experience to a large degree to be successful.

Above all he must have personality. Many executives, including those of our largest industrial corporations such as General Motors and General Electric Company rate personality as superior to technical ability. In fact Mr. Alfred Sloan, President of General Motors, rates it as 75 percent and technical ability 25 percent.

Personality in this instance may be defined as the ability to be a leader of men—to be able to handle

men and particularly to be able to select capable loyal men who will act as assisting executives.

Let us consider the manager's knowledge of design engineering. He must see that his chief engineer is supported in his desire for requisite quality, and must know something of the quality that is incorporated in competitors' products. Simliarly he must know what is up to date in design and material and support his engineer in seeing that modernity is expressed in this respect.

Above all he should establish a research department in engineering and be looking ahead to new developments, keepnig in touch with what is going on in his field and what are the trends. He should, generally speaking, know a little of the engineer's terms and understand what the engineer is talking about. Preferably and in many cases necessarily he should be able to read blueprints intelligently. Naturally the more engineering in character the nature of the main functions of the firm, then the more of an engineer must be the manager.

He should in the realm of production know something about its costs and their trends. Costs are rarely static; they are always going up or down, and the manager should keep in touch with the significance thereof. He should support his production manager in his desire to introduce new and better processes and processing. He should also be generally in touch with the latest developments in the equipment that pertains to his industry. He may have obtained this knowledge by an apprenticeship or he may gain it by constant contact with the men exercising the function of production.

He should keep constantly in touch with his personnel director and appreciate the state of the labor market. He should certainly be intimately acquainted with the labor conditions in his own plant and preferably in his own immediate territory. He should understand his own men and when called on should give them a square deal. Labor is too important a factor to be neglected by the general manager. When a knowledge of it is cultivated it gives a generous yield.

The plant engineer is another executive with whom the manager should contact frequently. Buildings must be maintained in good condition. Equipment and machine tools must be overhauled regularly and no obsolete machines or equipment tolerated.

One of the manager's most important duties lies in financial matters. He must see that money is set aside for probable future expansion. Money should also be available for purchase of some unforeseen material and for research of different kinds. There should be ample money particularly for the development of new models or products to keep the plant from stagnating. A wise manager will also set aside money for welfare work among his employees.

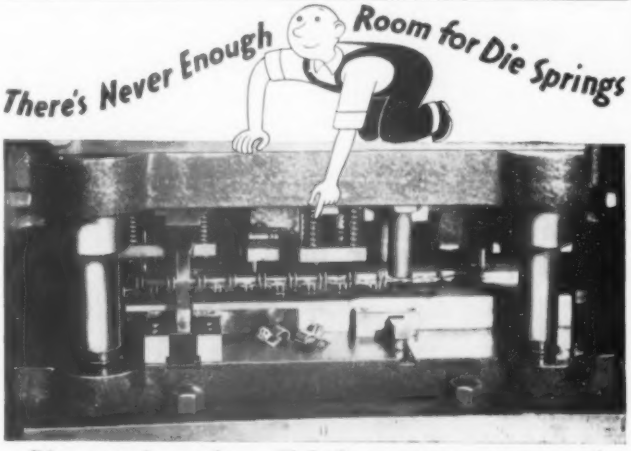
Probably next to his interest in money matters will lie a deep interest in sales. He should know how they are running. Is business picking up or slowing down and he must in conference with his other executives adjust the "tempo" of his plant to meet the condition of sales. Further he must know something about the satisfaction of his customers. Dissatisfied customers quickly ruin a plan and all effort on the part of every executive should be to satisfy customers as to quality and delivery. He should not only meet his sales manager frequently but should inspire his sales force by his presence at their conferences. Of course he should know something about the cost of sales as spent in advertising or personal or mail solicitation.

Over and above all these matters, the general manager should seek continuously and consistently to return a reasonable profit to his stockholders.

From this set of qualifications it follows that the general manager is not necessarily a man of Gene Tunney's physique, nor is he of the red-headed characteristics, but he as a hard-working individual, studying seriously his business problems. His desk may be clear of all details, but nevertheless he must have a grasp of them when needed. Routine matters need not interest him greatly but departure from routine should have his closest scrutiny.

L. P. Alford states in his "Laws of Management," "Managerial efficiency is greatly increased by concentrating managerial attention solely upon those executive matters which by concentrating managerial attention solely upon those executive matters which are variations from routine, plan, or standard."

Reports should be made regularly to the manager (preferably in chart form), giving him a synopsis of what is happening in all phases of the plant. A full view of the plant's operations and characteristics can be obtained very quickly, leaving him free to consider the broader lines of policy and to study the workings of his associate executives.



Die space is precious. Nobody wants to use more of it than necessary for springs. That's why you need the best. Danly Silico-Manganese Springs have a high fatigue point and give you uniform results with every ounce of metal working. It pays to use Danly Springs because they save you expensive shut-downs.

Order Die Springs, Die Makers' Supplies and Die Sets from your Danly Catalog, and send your requirements to the nearest branch office plant.

DANLY MACHINE SPECIALTIES, Inc.

2114 South 52nd Avenue Chicago, Illinois

BRANCHES:
Long Island City, N. Y., 36-12 34th St. Detroit, Mich., 1549 Temple Ave.
Cleveland, Ohio, 1444 E. 49th St. Dayton, Ohio, 114-116 N. St. Clair St.
Rochester, N. Y., 16 Commercial St.

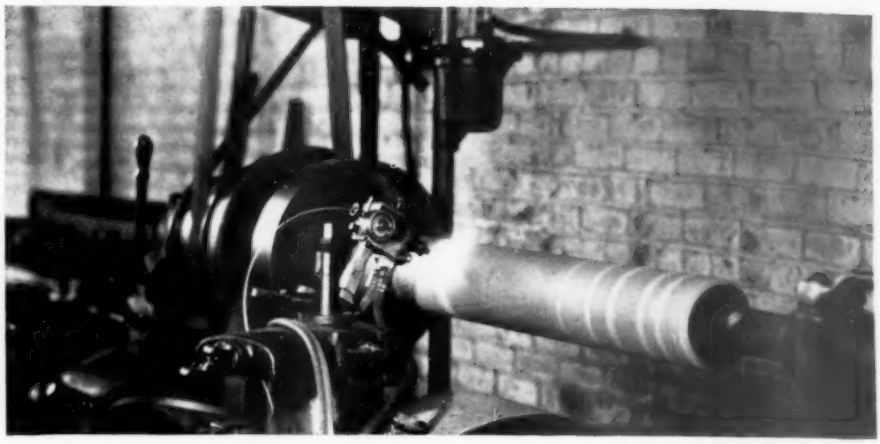
DANLY DIE MAKERS' SUPPLIES

DIVERSIFIED USES OF "METAL SPRAY" INTEREST THE TOOL ENGINEER

This Month's Cover Illustration shows a large drum being Metal Sprayed.

by

★ C. E. PHILLIPS



Showing application of high carbon steel to shaft by metal spray process

THE use of the Metal Spray Process is rapidly making headway in many lines of industry, due to the diversified uses to which the process may be put. Certain applications which have been developed, now make sure its entry into the realm of the tool engineer. The use of the process in the manufacture of new tools and tool equipment, may be very limited, but in salvaging and maintaining such tools and tool equipment, the process will find its place.

The preparation of the surface to which metal is to be sprayed is of prime importance. Wherever possible, the surface to be sprayed should be carefully blasted with hardened steel grit at high pressure, and care must be taken that such blasted surfaces are kept absolutely clean and free from moisture of all kinds prior to the time the sprayed metal is applied. The finely atomized particles of metal are blown on to such blasted surfaces with great force, and as these fine particles are in a plastic state at the time of impact, they lock and flatten themselves on to the blasted surface and to each other. These very minute particles, piling one on top of the other, permit the coating or building up of parts to the desired dimension.

The maintenance of shafts and spindles is one problem which the metal spray process can help to solve. While it is true that the mechanically interlocked particles of sprayed metal form a deposit with relatively low tensile strength, the deposit has its advantages which may offset its loss of tensile. Little accurate information is available concerning the structure of the deposited metal, but it is evident beyond doubt that, although not visible to the naked eye, the deposit is to some degree, porous. This slight porosity is of distinct advantage on shaft work, as will be explained.

In order to reduce the wear on shafts and spindles, high carbon steel is usually sprayed to such parts. The deposit is hard and has unusual resistance to wear. As the deposit is slightly porous, as stated, it has the tendency to give better lubrication, the film of oil adhering to the sprayed shaft better than to the base steel, and with the hard deposit, the wear is, in many cases, less than on new shafts, with consequent longer life. As the individual particles of the deposited metal are exceedingly minute, the deposit is readily ground and polished to accurate size.

It will be readily seen by the use of this process for reclaiming shafts and spindles, it is not only possible to bring them back to original size, but to also increase the size in order to compensate for wear on the bearings.

Due to the fact that very little heat is transferred into the shaft to be reclaimed, no trouble is encountered from warping and the attending straightening. Armature shafts are therefore reclaimed by this process, without removing the windings, at relatively low costs.

A recent case shows clearly the value of the process to the tool engineer. A fairly large number of tools were recently made on which an error on the size of the shanks had been made, the shanks being approximately .005 under size. The tools were completely finished before the error was found. The tool shanks were built up to the required size by the metal spray process, and all of the tools gave perfect satisfaction in operation.

Welch Plug Cutters
(Combined Core Drill and Facer)

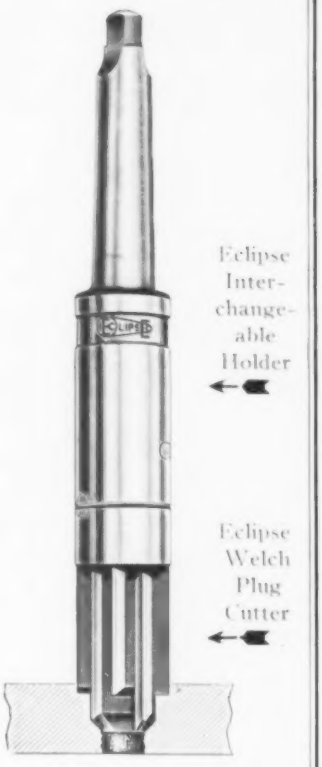
Welch Plug Cutters are designed for machining shallow cored holes, in one operation, preparatory to inserting and expanding Welch Core Hole Plugs.

Their use supersedes the old method of—first drilling and then counterboring the cored holes.

The advantage of these cutters over the old type step drill or counbore are many:—

NO CHATTER. ELIMINATES ONE OR MORE OPERATIONS.
LONGER LIFE. EASY TO SHARPEN ON CENTERS.
GREATER CHIP CLEARANCE. CUT SQUARE SHOULDERS.

Factory representatives in all industrial centers.



ECLIPSE COUNTERBORE COMPANY
DETROIT 7410-30 ST. AUBIN AVE MICHIGAN

A Pressed Steel Product

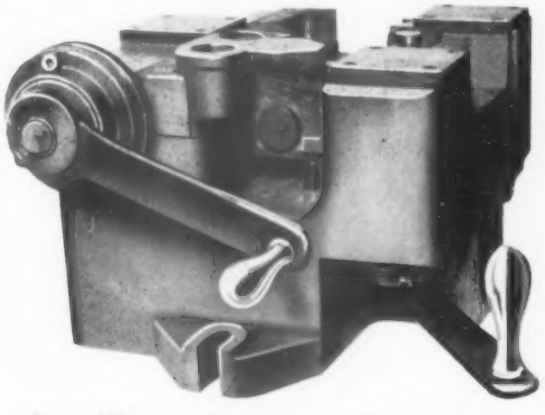
The New "DeStaCo" *Toggle Clamp*

is a well engineered product of pressed steel for almost universal application—reasonably priced. Can be had in several styles—with straight or flanged bases and with reversed action for vertical applications.

Ask for our catalog

Detroit Stamping Company
3445 W. Fort Street Detroit, Michigan
LAfayette 0382

Another Swartz Tooling Application

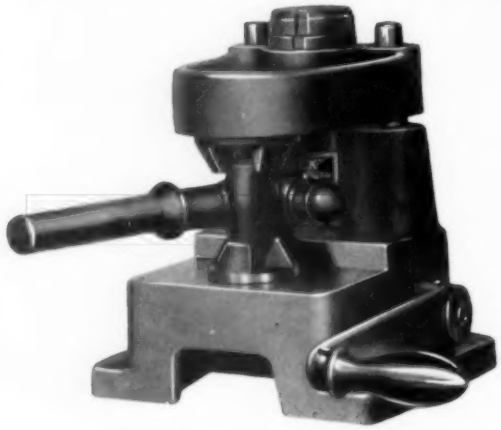


In milling operations a fixture lock is called upon to carry heavy over loads and be substantial in every respect. Swartz fixture locks have been developed to withstand service that work of this nature requires.

COMPLETE ENGINEERING AND BUILDING SERVICE

SWARTZ TOOL PRODUCTS CO., INC.
5259 Western DETROIT OR 7990

Siewek Rapid Clamping Drill Jigs



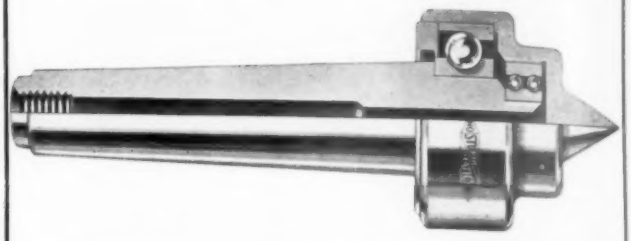
Quick acting, positive clamping, economy drill jigs increase drilling production—reduce operating effort and can accommodate more than one job at a time.

Sizes for all work—*immediate deliveries from stock.*

Send for new catalog

SIEWEK TOOL COMPANY

Ferndale, - - Michigan



STURDIMATIC LIVE CENTERS

for

Lathes, Grinders, Milling Machines, Etc.

REQUIRE LESS PRESSURE ON TAILSTOCK
ELIMINATE FRICTION OF DEAD CENTER
DO NOT DISTORT OR DAMAGE CENTER HOLE FOR SUBSEQUENT OPERATIONS
ELIMINATE CHATTER AS THERE IS NO PLAY BETWEEN CENTER AND WORK
THE STURDIMATIC CENTER IS CLOSE TO THE WORK THEREBY REDUCING OVERHANG TO A MINIMUM.

Write for catalog and free trial offer

STURDIMATIC TOOL CO.

5220 Third Ave. Detroit, Michigan

CUT GAGING COSTS WITH LONGER-LIVED PRECISION

Wear life depends on the finish. Let us show you why Lincoln Park finish *is* superior.

For severe use we recommend chromium plated gages

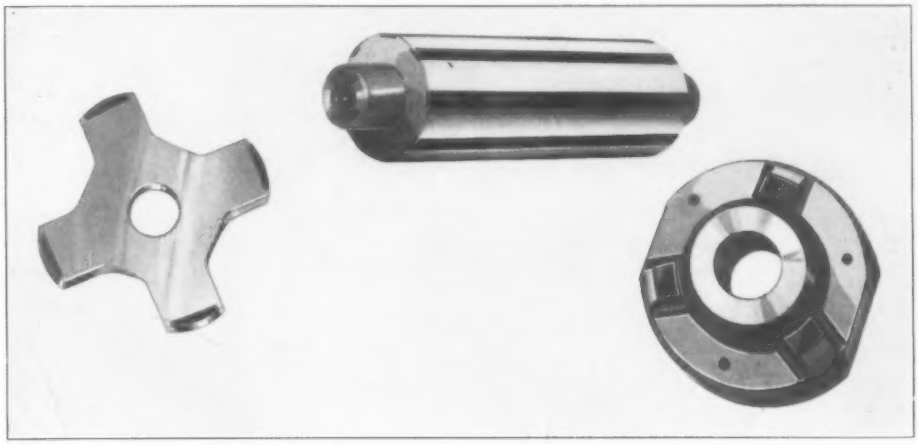
LINCOLN PARK TOOL AND GAGE CO.

LINCOLN PARK, ATLANTIC 0551 MICHIGAN

BORIUM *Applied to Gages Developed by* LANGLOIS

• • •

Inserts of this metal will give to Gages, Lathe Centers, Center-less Grinder Rests, and to any other tool application subjected to excessive wear, an increased life of 400% over any type of similar tool made of carbon or high speed steel.



Shown above are two Gages and an Arbor which are typical BORIUM applications.

• • •

Actual tests have proven that the use of BORIUM will reduce costly "down-time," losses through scrap, and will give more uniformity to parts produced on a production basis, due to the extremely long life of BORIUM to a given wear limit.

• • •

We will be pleased to submit to your Tool or Production Engineers more detailed facts on this product.

• • •

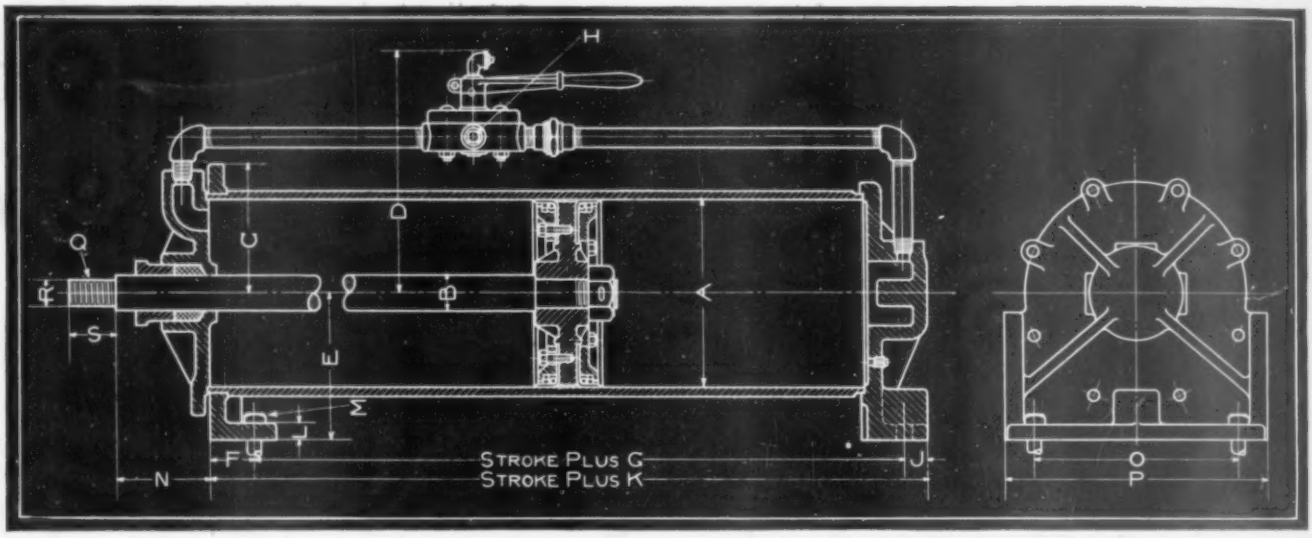
LANGLOIS GRINDING COMPANY

Precision Gage Makers — *Spray Metal* — *Pioneers in Chromium-Plated Gages*

DETROIT, — MICHIGAN

HANNA AIR CYLINDERS

The Hanna Air Cylinder has more to recommend it than any other method. Low initial cost; economy of operation; smooth, positive power easily conrolled permits unlimited applications. The air cylinder applications illustrated serve to show the extensive use of Hanna Air Cylinders for obtaining straight line motion of variable capacities and stroke which may be easily determined for each particular requirement.



DIMENSIONS OF NO. 3 & NO. 4 STYLE BRACKETED CYLINDERS

BELOW ARE DIMENSIONS IN INCHES WHICH CORRESPOND TO DIMENSION ABOVE INDICATED ALPHABETICALLY

DIA.	A	B	C	D	E	F	G	H	J	K	L	M BOLT	N	O	P	Q	R	S
3	3	3/4	2 1/2	7 3/4	2 5/8	1 1/4	3 3/8	1/2	5/8	5 1/4	1/2	5/8	3 1/2	3 3/4	5 1/4	10	3/4	1 1/4
4	4	3/4	3	8 1/4	3 1/8	1 1/4	3 7/16	1/2	5/8	5 5/16	1/2	5/8	3 1/2	4 3/4	6 1/4	10	3/4	1 1/4
5	5	1	3 3/4	9	4 3/4	1 7/8	3 7/16	1/2	3/4	6 1/16	9/16	1/2	3 1/2	5 5/8	7 1/8	10	3/4	1 1/4
6	6	1 1/2	4 5/16	9 9/16	4 3/4	1 13/16	3 3/4	1/2	1	6 9/16	5/8	1/2	4 1/4	6 1/2	8	9	7/8	1 1/2
7	7	1 1/2	5 5/16	10 9/16	5 3/4	1 7/8	3 13/16	1/2	1	6 11/16	5/8	5/8	4 1/4	7 1/2	10 1/4	7	1 1/8	2
8	8	1 1/2	6	12 1/16	6 7/8	1 7/8	4 1/4	3/4	1 1/4	7 3/8	3/4	5/8	4 1/4	8 5/8	11 5/8	7	1 1/8	2
9	9	1 1/2	6 5/8	12 11/16	6 7/8	2 3/8	4 7/16	3/4	1 1/4	8 1/16	7/8	3/4	4 5/16	10 1/2	12 1/2	7	1 1/4	2 1/2
10	10	2	7 1/8	13 3/16	8	2 1/2	4 1/2	3/4	1 1/4	8 1/4	7/8	3/4	5 1/8	11 1/4	14 1/2	6	1 1/2	2 1/2
12	12	2	8 7/16	14 1/2	9	2 1/2	4 5/8	3/4	1 1/4	8 3/8	1	3/4	5 1/8	14	17	5	1 3/4	2 3/4
14	14	2	9 1/2	15 9/16	11 1/4	2 3/8	5	3/4	1 1/2	8 7/8	1 1/8	3/4	5 1/8	15	19	5	1 3/4	3
16	16	2 1/2	10 7/8	17 3/8	11 1/4	3 1/4	5 1/2	1	1 1/2	10 1/4	1 1/4	7/8	5 5/8	16	21 1/4	5	1 3/4	3 1/4
18	18	2 1/2	12 1/8	18 1/2	14	4	5 5/8	1	2	11 5/8	1 3/16	1	5 5/8	19	24	4 1/2	2	3 1/2
20	20	2 1/2	13 1/2	20	14 1/4	4 3/4	5 7/8	1	2 1/4	12 7/8	1 1/2	1 1/8	5 5/8	21 1/2	26 1/2	4 1/2	2 1/4	4

OVERSIZE PISTON ROD DIMENSIONS

DIA.	B	N	Q	R	S
3	1	3 5/8	10	3/4	1 1/4
4	1 1/2	4 3/8	8	1	1 3/4
5	2	5 1/16	6	1 1/2	2 1/2
6	2	5 1/16	6	1 1/2	2 1/2
7	2 3/4	5 9/16	5	1 3/4	3
8	2 3/4	5 7/16	5	1 3/4	3
9	2 3/4	5 1/2	5	1 3/4	3
10	2 3/4	5 1/2	5	1 3/4	3
12	2 3/4	5 1/2	5	1 3/4	3
14	3 1/2	5 3/4	4	2 1/2	3 1/2
16	3 1/2	5 3/4	4	2 1/2	3 1/2
18	3 1/2	5 3/4	4	2 1/2	3 1/2
20	3 1/2	5 3/4	4	2 1/2	3 1/2

HANNA ENGINEERING WORKS

1765 Elston Avenue DETROIT OFFICE—TELEPHONE UNIVERSITY 12232 CHICAGO, ILLINOIS